Case histories I: HPHT, riserless drilling, cementing

IADC/SPE 59168

A Unique Cost Effective Technique for One Trip Selective Gravel Packing Over Multiple Zones: Dacion Field Case Study

The Dacion Field in Eastern Venezuela is a Miocene age deltaic sequence of thin, highly permeable sands interbedded with shale and coal seams. All zones require sand control. The multi-zone system described here utilizing shunt tubes and specially designed isolation packers requires only 5 ft of separation between perforated zones for complete gravel packed zonal isolation. Zones can be produced either separately or comingled through this completion. To date, over 20 wells with up to 3 zones in a well have been successfully completed in this manner.

—J C Marshall, Schlumberger IPM, *et al*

IADC/SPE 59169

Central Graben Extreme Offshore High-Pressure/High-Ttemperature Cementing Case Study

This paper presents the cementing case histories of 6 wells in 2 offshore HPHT development fields in the Central Graben area of the North Sea. Well depths averaged 6,000 m TVD, temperatures were greater than 200° C, the fracture/pore pressure margin was small, and the bottomhole pressure exceeded 1,100 bar. These downhole conditions are the most extreme yet experienced in a field development in the North Sea.

All aspects of cementing operations had to be carefully evaluated; in addition, new and enhanced equipment, processes, and materials had to be developed. Even though the potential for gas influx of the cement was high, the cement slurry formulation and placement techniques were successfully designed to resist gas migration through the use of materials with a low environmental impact. Because the formations were weak and unconsolidated, a special cement blend was used at the top of the well. The mixing equipment had to be modified to withstand the high-density fluids for the liner section.

No remedial cementing was necessary during these developments, which was an important objective for the operation. Remedial operations could have posed extreme risks and high costs.

—J North and E Gray, Halliburton Manufacturing & Services Ltd
—M Brangetto, Elf Exploration UK Ltd

IADC/SPE 59170

Foam Cementing Applications on a Deepwater Subsalt Well-Case History

This case-history paper presents an account of the cementing processes used to isolate 3 primary casing strings installed during the construction of a deepwater well drilled through hazardous and challenging environments. The primary focus of the paper is on planning, preparation and execution of the process of cementing a critical liner that covered the main section of a salt formation and the rubble zone below the salt. A new foam-cementing process was used to meet zonal-isolation requirements presented.

The work was done on **Shell's** Boris prospect, a deepwater exploratory well in the Mississippi Canyon formation in the Gulf of Mexico. Drilled in a subsalt environment, the well faced many zonal-isolation challenges: shallow-water flow, long salt sections, and disturbed or rubble zones above the salt sections.

—R R Faul, Halliburton Energy Services, *et al*

IADC/SPE 59172

Riserless Drilling with CaCl2 Mud Prevents Shallow Water Flows

The Mars basin is notorious for the worst shallow water flows (SWF) in the deepwater Gulf of Mexico. In August 1998, the SWF sands at the southern end of the basin were successfully drilled riserless to 2,105 ft below the mud line with 25,000 bbl of weighted CaCl2 mud stored in the ballast tanks of a semi-submersible drilling rig. The mud system was designed to be mixed and pumped at 1,000 gal/min.

This paper presents a case history of the Mississippi Canyon Block 941 No 1 riserless drilling interval from planning to execution. It took 4 months to prepare for the 26-in. hole interval, which drilled in 19 ½ hours.

—K M Turner, Vastar Resources Inc
—L J Morales, Baroid Drilling Fluids

IADC/SPE 59174 (ALTERNATE)

Optimized 16-in. and 12.25-in. Drilling in Hard, Interbedded, Abrasive Formations

This paper describes the drilling and geological characteristics of an area currently being developed off the east coast of Canada and the particularly difficult drilling encountered in the 16- and 12 ½-in. sections. In addition, the use of turbines in the 16- and 12 ½-in. sections will be presented as an effective alternative to rotary and PDMs hookups in the subject wells.

Certain performance criteria needs to be satisfied before turbine drilling can be chosen to drill in 16- and 12 ½-in. hole sections. These criteria are but are not limited to downhole vibration, hole quality, torque and WOB requirements, hydraulics and hole cleaning. These criteria are not unusual but the challenges imposed by turbines to meet the said requirements necessitates close inspection of (among others) bit design, gauge sleeve dimensions and the impact of cuttings size on mud quality and hole cleaning in large well bores.

—M B MacDougall, Mobil Oil Canada

IADC/SPE 59175 (ALTERNATE)

Continued Improvements on High Pressure/High Temperature Drilling Performance on Wells with Extremely Narrow Drilling Windows: Experiences From Mud Formulation to Operational Practices, Shearwater Project

This paper presents the experiences gained from mud formulation, hydraulics modelling to operational practices during the Shearwater HPHT project in the Central Graben area of the UK Continental Shelf. At Shearwater, reservoir pressure exceeds 15,000 psi, with a maximum temperature of 380° F. The 6-well HPHT project is currently more than 230 days ahead of schedule due to the continued improvements in performance, in which a robust mud system, optimum mud formulation, hydraulics modelling and best operational practices were significant.

—E Gao, Dowell
—M Booth, Maersk Contractors
—N MacBeth, Shell UK E&P